Automatic Railway Gate Controlling and Smart System of Railway Gate Crossing system

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Abstract: *In India, the major ways of transportation used are roads and railways, many a times the both are crossing over. For the smooth running of both, there are over bridges are used where there are major movement of vehicles. And in some places there are gates provided for controlling the crossover of both and other major cases none is provided that lead to accidents. In a big populated country like India, accidents are a daily crisis that is being faced by the people. Most of these accidents are road accidents, few percentages of these accidents occur on the railway level crossings.*

Keywords: railway level crossings

I. INTRODUCTION

In India, the major ways of transportation used are roads and railways, many a times the both are crossing over. For the smooth running of both, there are over bridges are used where there are major movement of vehicles. And in some places there are gates provided for controlling the crossover of both and other major cases none is provided that lead to accidents. In a big populated country like India, accidents are a daily crisis that is being faced by the people. Most of these accidents are road accidents, few percentages of these accidents occur on the railway level crossings. To prevent these accidents on the railway level crossing the automated system is proposed. The operation of railway gates at level crossings hasn't been reliable nowadays.The road users have to wait for a certain long time before the arrival of the train. Sometimes even after the train is left, the bystanders have to wait till the gate keeper opens the gates again.. And secondly the chances of accidents that usually made by the more. Then there's the importance of automatic , The chances of accidents are higher and more reliable operation is required. The proposed system is an arrangement of physical components which sense the arrival of the train and make the gate pull up and pull down automatically. As the train approaches to the level crossing from either side, the sensors placed at a certain distance from the gate detect the arrival train and gradually controls the operation of the gate. To prevent the accidents, sensors placed at certain distance from the gate will detect the departure of the train. The signal about the departure is sent to the Arduino, which in turn operates the motor and opens the gate. And, the traffic light will signal RED to alert the arrival of Train and then Timer runs and Buzzer buzzes alerting the traffic of the arrival of the train. The siren will alert this closing operation. After the Train crossed away, then the gate will open from its close state and the traffic light will turn into Green while the siren continues to buzz till the gate is totally open for the traffics to pass. Thus, the time in which the gate get closed is less compared to the manually operated gates since the gate is closed depending upon the telephone call from the previous station..

Problem Definition

This project explicitly deals with one of the most common problem that is traffic jams besides a railways crossing. The review of train accidents of the last 5 years (2009-10 to 2013-14) for which the data is available indicates that a large number of accidents happen because of derailments & at level crossing. NCRB says a total of 2,547 railway crossing accidents led to 2,575 deaths and 126 injuries across the country in 2014 Time for opening and closing the gate manually is more and it requires a separate man power for operation

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Objective:-

The major objectives of the project is to provide a safe environment for the smooth running of the both the railway transport system and the road transport system, and to reduce the accident that happening on these areas.
It will reduce the delay time of the opening and closing of the gates.
The project mainly done to automate the existing system that uses manual labor for the operation.
The project reduces the manual labor thereby reducing the manual error that may occur during the operation of the system.
It also reduces the manual time delay

II. LITERATURE SURVEY

Pressure Sensed Fast Response Anti Collision System for Automated Railway Gate Control:-
It develops the anti-collision system when sometimes vehicles get stuck at the level crossing of the rail-line and train is coming to that level crossing the railway gate automatically control and it will not change the signalling light for the train. The whole operation of this project has been controlled by a Microcontroller PIC16F84A.

Automatic Railway Gate Control System Using RFID with High Alerting System:-
This paper deals with control system of railway gate using the microcontroller. This model uses automatic control or operation of gate and reduces the human labors. The concept of the paper is to control the railway gate using microcontroller PIC16F877A.

**Automatic Control of Railway Gates and Destination Notification System using Internet of Things (IoT):-**
This paper proposed the advanced system of controlling the railway gate using Rasbery-Pi. A special feature is added to this system it also sends the destination notification using RFID (unique Id assigned for each train). To send the message to passengers an online portal way2sms is used. Here passenger needs to provide name, email id, password, and phone number.

Unmanned Multiple Railway Gates Controlling and Bi-directional Train Tracking with Alarming System using Principles of IoT:-
This paper developed the controlling of the railway gate by using the GPS (Global Positioning System) module to find out the location of train and distance between rail gate and train. And it also uses the GSM (Global System for Mobile) module for sending alert message to any kind of vehicle

III. SYSTEM DESIGN

3.1 Block Diagram
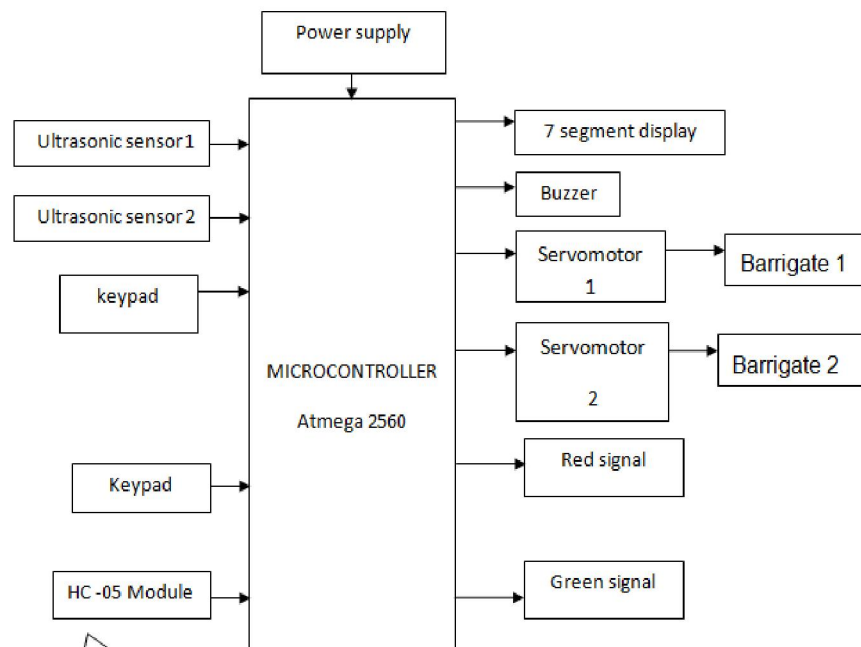
Block Diagram Description-

The proposed system uses ultrasonic sensors which have very high efficiency. These ultrasonic sensors are placed near the rail line at the both side of the level crossing. These sensors which are placed at certain distance from the level crossing detect the train coming from either direction to the level crossing. Then the information of the train is transferred to the control unit and the control unit switches on the red light, generates alarm and pull down the gate immediately. The sensors of the either side determines whether the train passes a certain distance or not from the level crossing. If passes the controller switches on the green light, stops generation of alarm and pull the gate up. If any vehicle gets stuck at the level crossing of the rail-line is detected by the sensor placed at the level crossing. Our proposed system is very simple and inexpensive with respect to other system but its performance is very laudable and excellent..

Component Specification

A. Microcontroller (ATMEGA 2560)

Arduino board is an open-source microcontroller board which is based on Atmega 2560 microcontroller. The growth environment of this board executes the processing or wiring language. These boards have recharged the automation industry with their simple to utilize platform wherever everybody with small otherwise no technical backdrop can start by discovering some necessary skills to program as well as run the Arduino board. These boards are used to extend separate interactive objects otherwise we can connect to software on your PC like MaxMSP, Processing, and Flash. This article discusses an **introduction to Arduino mega 2560 board**, pin diagram and its specifications.

What is an Arduino Mega 2560?

The microcontroller board like "Arduino Mega" depends on the ATmega2560 microcontroller. It includes digital input/output pins-54, where 16 pins are analog inputs, 14 are used like PWM outputs hardware serial ports (UARTs) – 4, a crystal oscillator-16 MHz, an ICSP header, a power jack, a USB connection, as well as an RST button. This board mainly includes everything which is essential for supporting the microcontroller. So, the power supply of this board can be done by connecting it to a PC using a USB cable, or battery or an AC-DC adapter. This board can be protected from the unexpected electrical discharge by placing a base plate.
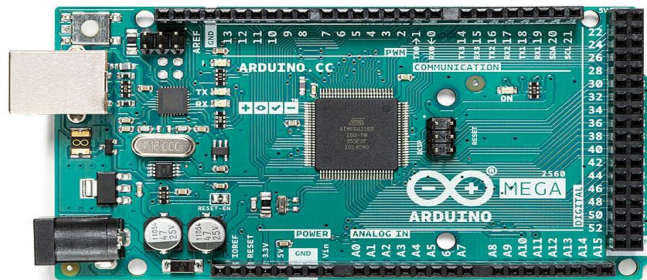
The SCL & SDA pins of Mega 2560 R3 board connects to beside the AREF pin. Additionally, there are two latest pins located near the RST pin. One pin is the IOREF that permit the shields to adjust the voltage offered from the Arduino

board. Another pin is not associated & it is kept for upcoming purposes. These boards work with every existing shield although can adjust to latest shields which utilize these extra pins.

Arduino Mega Specifications

The specifications of Arduino Mega include the following.

The ATmega2560 is a Microcontroller

The operating voltage of this microcontroller is 5volts

The recommended Input Voltage will range from 7volts to 12volts

The input voltage will range from 6volts to 20volts

The digital input/output pins are 54 where 15 of these pins will supply PWM o/p.

Analog Input Pins are 16

DC Current for each input/output pin is 40 mA

DC Current used for 3.3V Pin is 50 mA

Flash Memory like 256 KB where 8 KB of flash memory is used with the help of bootloader

The static random access memory (SRAM) is 8 KB

The electrically erasable programmable read-only memory (EEPROM) is 4 KB

The clock (CLK) speed is 16 MHz

The USB host chip used in this is MAX3421E

The length of this board is 101.52 mm

The width of this board is 53.3 mm

The weight of this board is 36 g

Arduino Mega Pin Configuration

The pin configuration of this **Arduino mega 2560** board is shown below. Every pin of this board comes by a particular function which is allied with it. All analog pins of this board can be used as digital I/O pins. By using this board, the Arduino mega projected can be designed. These boards offer flexible work memory space is the more & processing power that permits to work with different types of sensors without delay. When we compare with other types of Arduino boards, these boards are physically superior.
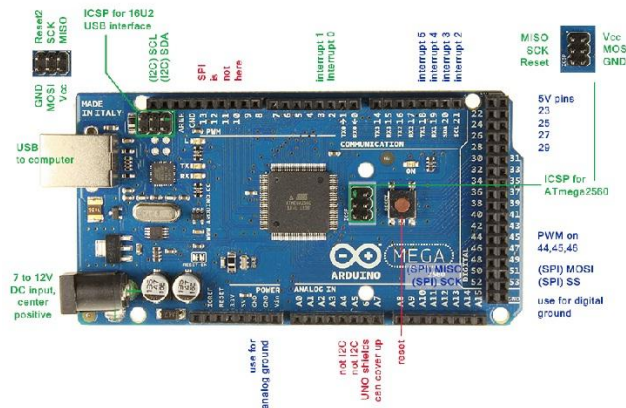

B. 16 X 2 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.
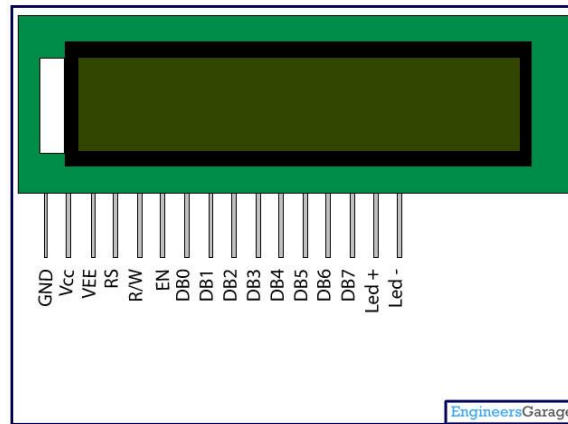
6. Interface pin description

Pin no.	Symbol	External connection	Function
1	Vss	Power supply	Signal ground for LCM
2	V_{DD}		Power supply for logic for LCM
3	V_0		Contrast adjust
4	RS	MPU	Register select signal
5	R/W	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

V0 (Set Lcd contrast)

Set lcd contrast here. Best way is to use variable resistor such as potentiometer. Output of the potentiometer is connected to this pin. Rotate the potentiometer knob forward and backward to adjust the lcd contrast.

RS(Register select)

Their are two registers in every lcd

1 Command Register

2 Data Register

Command Register

When we send commands to lcd these commands go to Command register and are processed their.

Commands with their full description are given in the picture below.

When RS=0   Command Register is Selected.

Data Register

When we send Data to lcd it goes to data register and is processed their.

When RS=1   Data Register is selected.

RW(Read - Write)

When RW=1 We want to read data from lcd.

When RW=0 We want to write to lcd.

EN(Enable signal)

When you select the register(Command and Data) and set RW(read - write) now its time to execute the instruction. By instruction i mean the 8-bit data or 8-bit command present on Data lines of lcd.

This requires an extra voltage push to execute the instruction and EN(enable) signal is used for this purpose. Usually we make it en=0 and when we want to exectue the instruction we make it high en=1 for some milli seconds. After this we again make it ground en=0.

Data which we send to our lcd can be any alphabet(small or big), digit or ASCII character.

NOTE: we cannot send an integer,float,long,double type data to lcd because lcd is designed to display a character only. The 8 data pins on lcd carries only ASCII 8-bit code of the character to lcd. However we can convert our data in character type array and send one by one our data to lcd. Data can be sent using lcd in 8-bit 0r 4-bit mode. If 4-bit mode is used, two nibbles of data (First high four bits and then low four bits) are sent to complete a full eight-bit transfer. 8-bit mode is best used when speed is required in an application and at least ten I/O pins are available. 4-bit mode requires a minimum of seven bits. In 4-bit mode, only the top 4 data pins (4-7) are used

No.	Instruction	Hex	Decimal
1	Function Set: 8-bit, 1 Line, 5x7 Dots	0x30	48
2	Function Set: 8-bit, 2 Line, 5x7 Dots	0x38	56
3	Function Set: 4-bit, 1 Line, 5x7 Dots	0x20	32
4	Function Set: 4-bit, 2 Line, 5x7 Dots	0x28	40
5	Entry Mode	0x06	6
6	Display off Cursor off (clearing display without clearing DDRAM content)	0x08	8
7	Display on Cursor on	0x0E	14
8	Display on Cursor off	0x0C	12
9	Display on Cursor blinking	0x0F	15
10	Shift entire display left	0x18	24
12	Shift entire display right	0x1C	30
13	Move cursor left by one character	0x10	16
14	Move cursor right by one character	0x14	20
15	Clear Display (also clear DDRAM content)	0x01	1
16	Set DDRAM address or coursor position on display	0x80+add	128+add

Command 0x30 means we are setting 8-bit mode lcd having 1 line and we are initializing it to be 5x7 character display.Now this 5x7 is some thing which every one should know what it stands for. usually the characters are displayed on lcd in 5x8 matrices form. where 5 is total number of coulombs and is number of rows.Thus the above

0x30 command initializes the lcd to display character in 5 coulombs and 7 rows the last row we usually leave for our cursor to move or blink etc.

The Character is displayed on lcd screen in 5x8 or 5x7 matrix. Where 5 represents number of coulombs and 7,8 represent number of rows. Maximum size of the matrix is 5x8. You can not display character greater then 5x8 dimension matrix. To display character greater than this dimension you have to switch to graphical lcds. To learn about graphical lcds here is a good tutorial GRAPHICAL LCD WORKING AND PINOUT.

- The command 0x38 means we are setting 8-bit mode lcd having two lines and character shape between 5x7 matrix.
- The command 0x20 means we are setting 4-bit mode lcd having 1 line and character shape between 5x7 matrix.
- The command 0x28 means we are setting 4-bit mode lcd having 2 lines and character shape   between 5x7 matrix.
- The command 0x06 is entry mode it tells the lcd that we are going to use you'
- The command 0x08 dispalys cursor off and display off but with out clearing DDRAM contents.
- The command 0x0E displays cursor on and dispaly on.
- The command 0x0c dispaly on cursor off(displays cursor off but the text will appear on lcd)
- The command 0x0F dispaly on cursor blink(text will appear on screen and cursor will blink).
- The command 0x18 shift entire dispaly left(shift whole off the text on the particular line to its left).
- The command 0x1C shift entire dispaly right(shift whole off the text on the particular line to its right).
- The command 0x10 Moves cursor one step left or move cursor on step a head to left when ever new character is displayed on the screen.
- The command 0x14 Moves cursor one step right or move cursor on step a head to righwhen ever new character is displayed on the screen.
- The command 0x01 clear all the contents of the DDRAM and also clear the lcd removes all the text from the screen.
- The command 0x80 initialize the cursor to the first position means first line first matrix(start point) now if we add 1 in 0x80+1=0x81 the cursor moves to second matrix.

16x1 lcd displays 16 characters only. The first will appear on 0x80 second 0x81 third 0x82 and so on until last, the 16 once on address 0x8F.

C. Segment Display:-
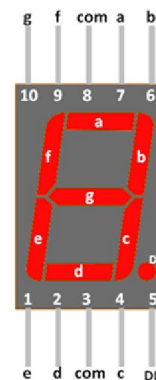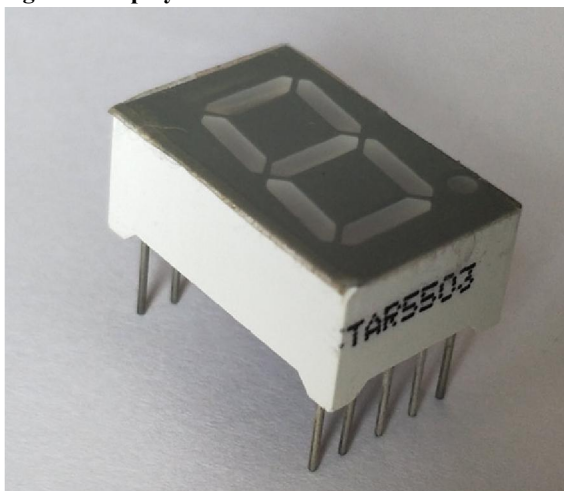
The **7 segments displays** are one of the popular types of display used in various types of embedded applications and devices. These displays have 8 LEDs inside it to display numbers and alphabets

Pin Number	Pin Name	Description
1	e	Controls the left bottom LED of the 7-segment display
2	d	Controls the bottom most LED of the 7-segment display
3	Com	Connected to Ground/Vcc based on type of display
4	c	Controls the right bottom LED of the 7-segment display
5	DP	Controls the decimal point LED of the 7-segment display
6	b	Controls the top right LED of the 7-segment display
7	a	Controls the top most LED of the 7-segment display
8	Com	Connected to Ground/Vcc based on type of display
9	f	Controls the top left LED of the 7-segment display
10	g	Controls the middle LED of the 7-segment display

7-Segment Display Features

- Available in two modes Common Cathode (CC) and Common Anode (CA)
- Available in many different sizes like 9.14mm,14.20mm,20.40mm,38.10mm,57.0mm and 100mm (Commonly used/available size is 14.20mm)
- Available colours: White, Blue, Red, Yellow and Green (Res is commonly used)
- Low current operation
- Better, brighter and larger display than conventional LCD displays.
- Current consumption : 30mA / segment
- Peak current : 70mA

7-segment Display Brief Intro

The **seven segments displays** are the oldest yet one of the efficient types of display used in embedded applications. This display has nothing more than 8 LED inside it. These 8 LEDs are separated into each segments which can be named as a,b,c,d,e,f,g,DP as shown in the picture above. These entire 8 segment LEDs have one end of their pins pulled out of the module as shown above and the other ends are connected together and pulled out as the Common pin. So to make an LED of a particular segment glow we just have to power common pin along with the segment pin. This way we can power more than one segment at a time to represent the numeric number 0-9 and also few Alphabets as shown on the graphic image below. We also have an option to show a decimal point using the DP pin.

Selecting your 7-Segment Display

As discussed in the Features there are many options to choose for a 7-segment display. There many different types of size and colours to select from. The default and most commonly used / available one is the 14.20mm with Red colour display as show in the above animation. If you are planning to make your project look out of the box, then other colour display can also be used. Also note that as size and colour differs the amount of current consumed by the display will also differ. The Red colour one is universally used since it consumes less current than other colours.

Now, there is another important parameter which you have to concentrate before buying this module. There are two types of seven segment displays - Common Anode display and Common Cathode display. We cannot use a circuit/program designed for Common Anode display for Common Cathode or vice versa.

Common Cathode (CC) 7 Segment Display

The common cathode display is commonly called CC display. In this type the common pin on the 7-segment display is connected to all the eight Cathode pins of the LEDs. So In order to make this type of seven segment display to work we should connect he Com pin to the Ground pin and power the other pins with Vcc (+5V typically).
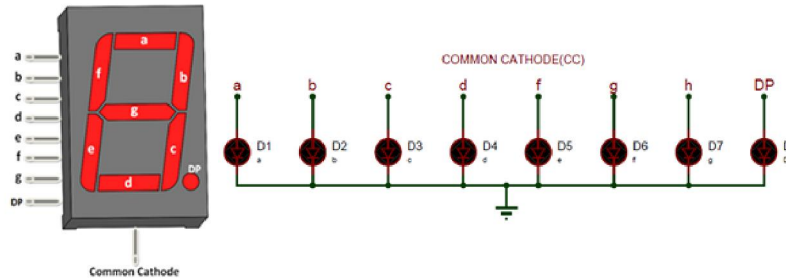
Common Anode (CA) 7 Segment Display

The common anode display is commonly called CA display. In this type the common pin on the **7-segment display** is connected to all the eight Anode pins of the LEDs. So In order to make this type of seven segment display to work we should connect he Com pin to the Vcc (+5V typically) and ground the required segment pin to turn it on.
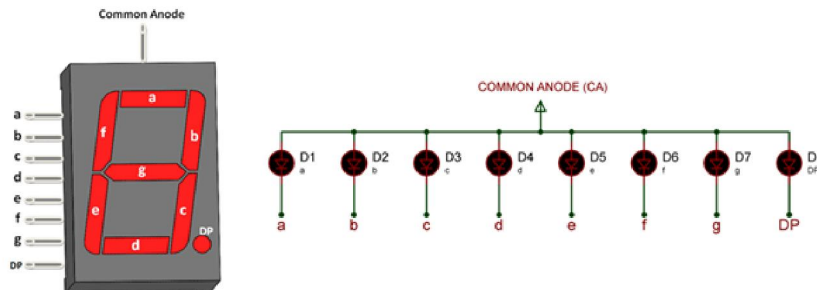
How to use a 7-Segment display

One important advantage of a 7-segment display is that, it is very easy to use. Unlike other display modules a 7-segment display can be made to work even without a Microcontroller or a Microprocessor.

This is possible because of the readily available 7-segment counter IC's like IC CD4026. This IC can be used in combination with the display for projects which have very simple circuits. The IC can drive one 7-segment display module and the number that is being displayed can also be incremented or decremented.

But, most commonly a seven segment display is used along with a MCU/MPU in that case, the eight segment pins will be connected to the I/O pins of the Microcontroller and the com pin will be connected to the ground of Vcc depending upon its type (CC/CA). Then these IO pins can be toggled in a particular sequence to display the desired numbers. This particular sequence is explained through the table below. For displaying each number in the seven segment display its respective sequence is given in the table. If we want to display the number "0", then we need to glow all the LEDs except LED which belongs to line "g" (see 7 segment pin diagram above, so we need a bit pattern 11000000. Similarly to display "1"we need to glow LEDs associated with b and c, so the bit pattern for this would be 11111001.

Applications

- Used in applications where font size is required to be bigger
- Microcontroller Independent, hence used in small circuit projects
- Used in combination with four segments to display measurement/sensor value with four characters
- Has bright illumination, hence used where display are required to work in low light or dark conditions

D. Power Supply

All electronic circuits use DC power supply of adequate voltage for their operation.

To obtain this DC voltage from 230V AC mains, we need to use a 'rectifier'. The rectified DC voltage is 'pulsating ' in nature. We know that a combination of rectifier & filter can produce a dc voltage which is almost pure i.e. ripple free.

However, the problem with such a power supply is that its output voltage will not remain constant in the event of fluctuations in ac input voltage or changes in load current. This type of power supply is called as unregulated power supply.

The power supply, which provides a constant output voltage irrespective of everything is called, regulated power supply. So we have to design a regulated power supply using series voltage regulator IC 7805.

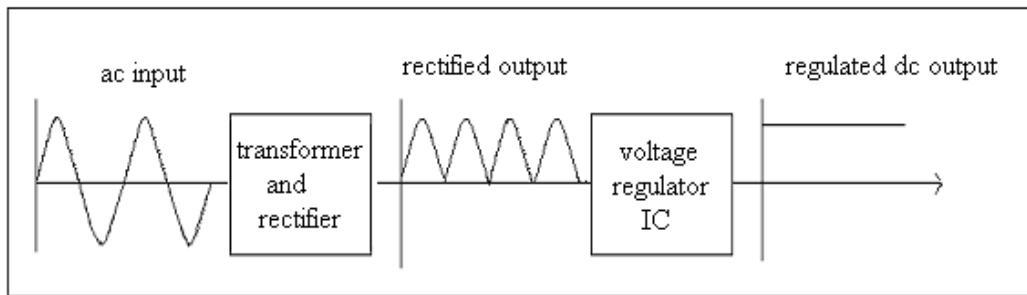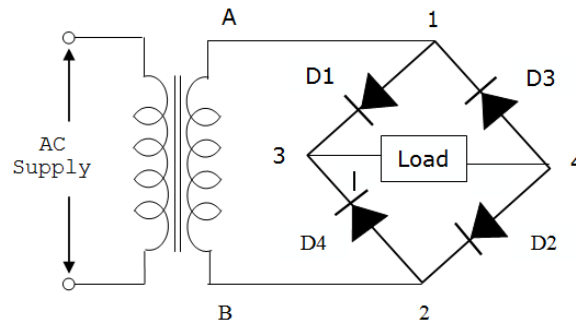Following figure shows general block diagram of regulated power supply.

FIGURE 8: GENERAL BLOCK DIAGRAM OF POWER SUPPLY

BRIDGE RECTIFIER

Bridge rectifier circuit consists of four diodes arranged in the form of a bridge as shown in figure.


OPERATION

During the positive half cycle of the input supply, the upper end A of the transformer secondary becomes positive with respect to its lower point B. This makes Point1 of bridge Positive with respect to point 2. The diode D1 & D2 become forward biased & D3 & D4 become reverse biased. As a result a current starts flowing from point1, through D1 the load & D2 to the negative end. During negative half cycle, the point2 becomes positive with respect to point1. Diodes D1 & D2 now become reverse biased. Thus a current flow from point 2 to point1.

E. LM 7805
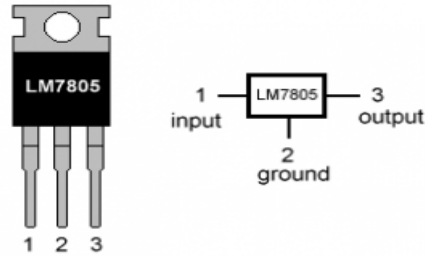
The MC78XX/LM78XX/MC78XXA series of three terminal positive regulators are available in theTO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents

F. Resistors

A resistor is a two-terminal electronic component designed to oppose an electric current by producing a voltage drop between its terminals in proportion to the current, that is, in accordance with Ohm's law:

$$V = IR$$

Resistors are used as part of electrical networks and electronic circuits. They are extremely commonplace in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel/chrome).

The primary characteristics of resistors are their resistance and the power they can dissipate. Other characteristics include temperature coefficient, noise, and inductance. Less well-known is critical resistance, the value below which power dissipation limits the maximum permitted current flow, and above which the limit is applied voltage. Critical resistance depends upon the materials constituting the resistor as well as its physical dimensions; it's determined by design.

Resistors can be integrated into hybrid and printed circuits, as well as integrated circuits. Size, and position of leads (or terminals) are relevant to equipment designers; resistors must be physically large enough not to overheat when dissipating their power.

A resistor is a two-terminal passive electronic component which implements electrical resistance as a circuit element. When a voltage V is applied across the terminals of a resistor, a current I will flow through the resistor in direct proportion to that voltage. The reciprocal of the constant of proportionality is known as the resistance R, since, with a given voltage V, a larger value of R further "resists" the flow of current I as given by Ohm's law:

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel-chrome). Resistors are also implemented within integrated circuits, particularly analog devices, and can also be integrated into hybrid and printed circuits.

The electrical functionality of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than 9 orders of magnitude. When specifying that resistance in an electronic design, the required precision of the resistance may require attention to the manufacturing tolerance of the chosen resistor, according to its specific application. The temperature coefficient of the resistance may also be of concern in some precision applications. Practical resistors are also specified as having a maximum power rating which must exceed the anticipated power dissipation of that resistor in a particular circuit: this is mainly of concern in power electronics applications. Resistors with higher power ratings are physically larger and may require heat sinking. In a high voltage circuit, attention must sometimes be paid to the rated maximum working voltage of the resistor.

The series inductance of a practical resistor causes its behavior to depart from ohms law; this specification can be important in some high-frequency applications for smaller values of resistance. In a low-noise amplifier or pre-amp the noise characteristics of a resistor may be an issue. The unwanted inductance, excess noise, and temperature coefficient are mainly dependent on the technology used in manufacturing the resistor. They are not normally specified individually for a particular family of resistors manufactured using a particular technology. A family of discrete resistors is also characterized according to its form factor, that is, the size of the device and position of its leads (or terminals) which is relevant in the practical manufacturing of circuits using them.

Units

The ohm (symbol: Ω) is the SI unit of electrical resistance, named after Georg Simon Ohm. An ohm is equivalent to a volt per ampere. Since resistors are specified and manufactured over a very large range of values, the derived units of milliohm (1 mΩ = 10−3 Ω), kilohm (1 kΩ = 103 Ω), and megohm (1 MΩ = 106 Ω) are also in common usage.

Variable resistors

Adjustable resistors

A resistor may have one or more fixed tapping points so that the resistance can be changed by moving the connecting wires to different terminals. Some wirewound power resistors have a tapping point that can slide along the resistance element, allowing a larger or smaller part of the resistance to be used.

Where continuous adjustment of the resistance value during operation of equipment is required, the sliding resistance tap can be connected to a knob accessible to an operator. Such a device is called a rheostat and has two terminals.

Potentiometers

A common element in electronic devices is a three-terminal resistor with a continuously adjustable tapping point controlled by rotation of a shaft or knob. These variable resistors are known as potentiometers when all three terminals are present, since they act as a continuously adjustable voltage divider. A common example is a volume control for a radio receiver.

Accurate, high-resolution panel-mounted potentiometers (or "pots") have resistance elements typically wire wound on a helical mandrel, although some include a conductive-plastic resistance coating over the wire to improve resolution. These typically offer ten turns of their shafts to cover their full range. They are usually set with dials that include a simple turns counter and a graduated dial. Electronic analog computers used them in quantity for setting coefficients, and delayed-sweep oscilloscopes of recent decades included one on their panels.
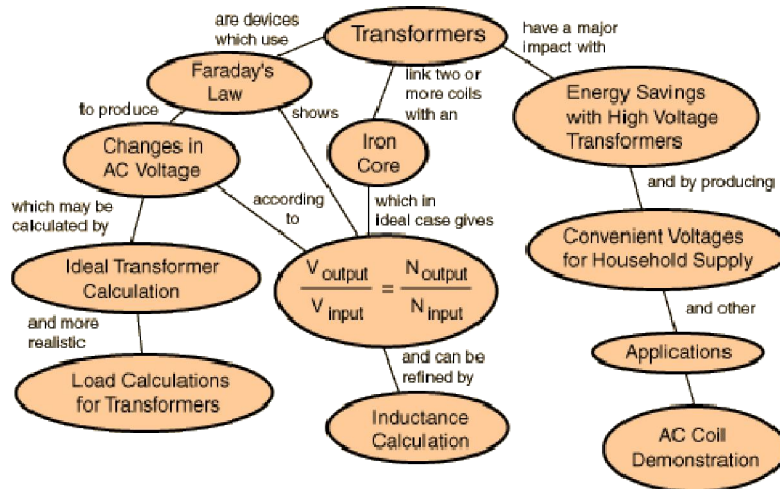
G. Transformer

A transformer makes use of Faraday's law and the ferromagnetic properties of an iron core to efficiently raise or lower AC voltages. It of course cannot increase power so that if the voltage is raised, the current is proportionally lowered and vice versa.
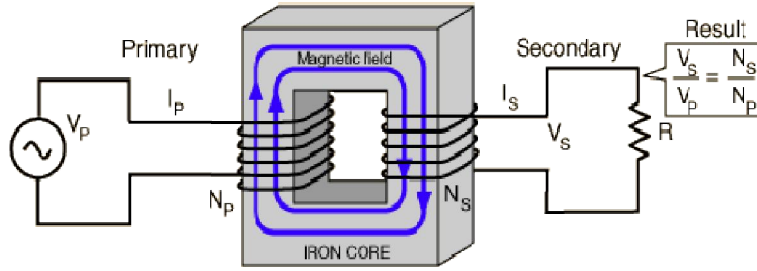
Transformer and Faraday's Law
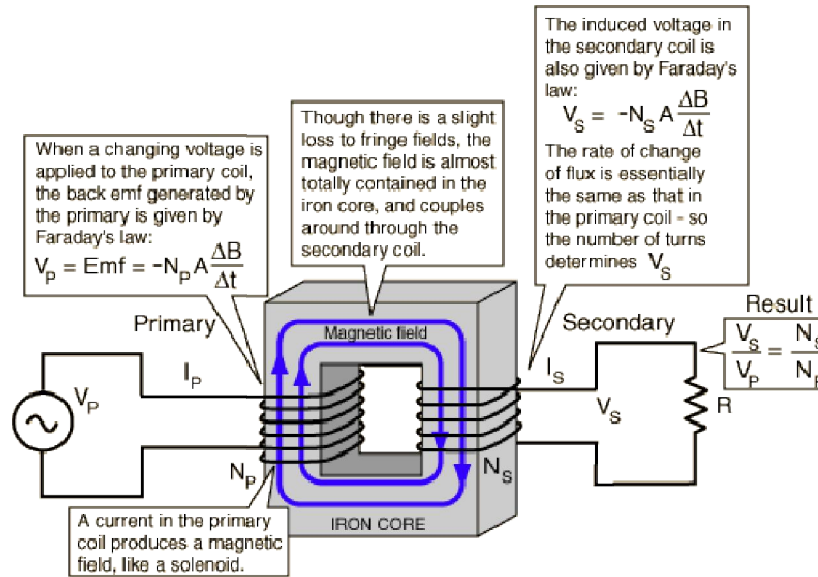
TRANSFORMER CONCEPTS

H. Ultarsonic Sensor

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

(1) Using IO trigger for at least 10us high level signal,

(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time×velocity of sound (340M/S) / 2,

Wire connecting direct as following:

5V Supply

Trigger Pulse Input

Echo Pulse Output

0V Ground

Electric Parameter

Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm
MeasuringAngle	15 degree
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in
Dimension	45*20*15mm

Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: uS / 58 = centimeters or uS / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.
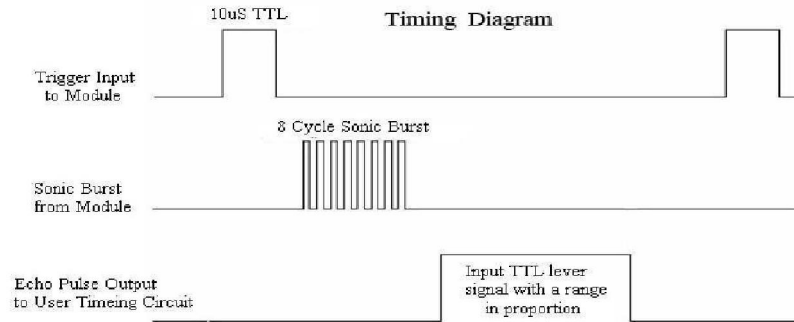
Attention:

The module is not suggested to connect directly to electric, if connected electric, the GND terminal should be connected the module first, otherwise, it will affect the normal work of the module.

When tested objects, the range of area is not less than 0.5 square meters and the plane requests as smooth as possible, otherwise ,it will affect the results of measuring.

I. Buzzer
MICRO BUZZER 5V DC / 20mA PCB TYPE

Features
sealed: yes
operating power: 3-6V DC / 25mA
extremely compact, ultrathin construction
no electrical noise
low current consumption yet high sound pressure level

Specifications
tone type: single
operating voltage: 3-6V DC
rated voltage: 5V DC
current consumption: 25mA
osc. frequency: 3.2kHz
sound level: 87dB
connector type: pcb
body color: gray
weight: 0.056oz

IV. PROJECT PLAN

Week No	Action plan
1	Searching of Project information
2	Collection of components required for project
3	Designing of PCB , printing of copper for interior layer
4	Etching, drilling, layer alignment of PCB
5	Mounting components on PCB as per circuit diagram
6	Soldering components on PCB
7	Software Development for the project
8	Testing circuit is proper or not
9	Troubleshooting for any problems
10	Checking project is properly working or not if not then correct
11	Presentation of report
12	Presentation of PPT
13	Checking project from project guide
14	Checking report & PPT from project guide
15	Confirmation from project guide, co-ordinator , HOD
16	Submission of Project model, Project report, PPT

V. ADVANTAGES AND DISADVANTAGES

Advantages

- The proposed system attempts to develop a system which automates the gate operations, which also reduces human power and also increases the efficiency.
- It Minimize the maintenance cost and one time installation is done instead of various times installation.
- Our proposed system is very simple and inexpensive with respect to other system but its performance is very laudable and excellent.

Disadvantages

- Limited scope
- Technical challenges
- High cost

Application

- Image detection can be used for more precise, with the help of cameras.
- Damage detection can be included that help us to automatically detect any issues with the system.
- Thermal for animal detection and suitable radiation for moving them away, that helps us reduce the accidents in the area of the gate

VI. CONCLUSION

Conclusion

- Thus, the project developed the Automatic Railway Gate Control using IoT, which control the Railway Gate, Signals, Buzzer and also send same data on the Mobile Application.
- This project is fully automated thus this project is very useful in remote places and villages where the railway gatekeeper is not present.
- The Mobile Application is also shows the accurate status of Railway Gate.

Future Scope

- Prevention of accidents inside the gate.
- An Automatic Railway Gate Control is implemented with very simple hardware and easy control.
- Human intervention at level crossings can be removed with the help of this project and many railway level crossing accidents can be prevented.
- Easy to operate.
- Avoid man power.
- Reduce the operation .
- Reduction of the time to wait vehicle

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